

DEC STD 100-5 Engineering Change Orders - Financing ECOs to Hardware

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ABSTRACT: This section of DEC STD 100 describes the policy and procedure for financing ECOs to hardware products.

APPLICABILITY: This financial procedure applies to all ECOs affecting Digital hardware, including firmware.

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1 INTRODUCTION

This section describes the policy and procedure for financing engineering change orders (ECOs) to hardware products.

This standard describes the policy and procedure for assigning financial responsibilities for ECOs to hardware. Four key elements of ECO financing are:

- Component of ECO costs
- Inventory reference point marking the transition of financial responsibility from engineering to manufacturing and logistics, and the Service Delivery Organization.
- Types of ECOs and financial responsibility for each type
- Ongoing engineering responsibility for ECO support regardless of financial responsibility

The ECO implementation should be based on the lowest cost to Digital and be consistent with its customer satisfaction goals. ECO implementation choices must not be based on who or which group or department will pay for implementation of the ECO.

Although this standard references the automated systems for tracking and controlling ECO charges, it does not address the corporate accounting of such spending.

A thorough discussion of the character and purpose of ECOs to hardware are found in *DEC STD 100-1 Engineering Change Orders—Hardware*.

1.1 RESPONSIBILITIES

This subhead is about the responsibilities for the product team, engineering, and manufacturing group controllers.

1.1.1 Product Team

At a minimum, the project team shall consist of representatives from engineering, manufacturing and logistics, and the Service Delivery Organization.

1.1.2 Engineering and Manufacturing Group Controllers

Plant controllers must coordinate their activities with engineering finance managers and group and engineering controllers. Their responsibilities are described here:

- a. Plant Controllers are responsible for ensuring that:
 - All manufacturing and logistics related ECO costs are captured, segregated, and charged to a discrete 6XXX non-first-in-first-out (non-FIFO) manufacturing period expense account that is titled ECO Variance.
 - Valid ECO cross-charges to design engineering are charged to 9XXX expense accounts with a trailing valid project number.
 - Valid ECO cross-charges comply with *Corporate Accounting and Reporting Manual (CARM) Policy 301-20 Accounting for Allocations*.
 - Compliance is maintained with *DEC STD 028-0 Phase Review Policy* and *DEC STD 100-0 Policy and Requirements for the Product Change Process*.

- All ECO transactions are documented and retrievable regarding research and experimentation (R and E) tax credits (U.S. only).
 - All ECO transactions are documented and retrievable regarding Corporate external reporting requirements for long lived asset write-offs.
 - Plant Controllers are also responsible for determining, classifying, and documenting, in conjunction with the affected engineering finance manager, ECOs in the context of the general rules of DEC STD 028-0 and DEC STD 100-0.
- b. Engineering finance managers are responsible for:
- Analyzing their organizations' discrete projects to ensure that only documented valid ECO charges are booked.
 - Analyzing ECO charges for possible R and E tax credit qualifications (U.S. only).
 - Determining, classifying, and documenting, in conjunction with the affected plant controllers, ECOs in the context of the general rules of DEC STD 028-0 and DEC STD 100-0.
- c. Group controllers and engineering controllers are responsible for:
- Ensuring compliance with this standard.
 - Resolving ECO cost absorption disputes.

2 FINANCING ECOs for DIGITAL HARDWARE

Financing ECOs for Digital hardware may occur at any phase of a product's life cycle: when it is in development or when it is mature. The project team shall properly assign ECO cost responsibilities using this standard as necessary.

2.1 TYPES OF ECO

An ECO will always be in one of the followings codes:

1. Code 1 Safety: This type code is used to correct a potential hazard to life or limb of operators or nearby people. This type code is also used when the risk of significant loss of property may occur as a result of explosion or fire. When a safety problem is acknowledged, Service Delivery Organization Safety and Liability must be made aware of the safety problem before the solution is implemented as well as approve the ECO as a member of the Product Change Team.
2. Code 2 Not to specification: This type code is used to identify and correct design deficiencies that has either caused or has the potential to cause a malfunction or inability to meet established specifications for the product.
3. Code 3 Cost reduction: An ECO of this type code is used to implement a change that will decrease the direct cost of material, labor, or test incurred during the production or repair process, increase manufacturing and logistics yields, or improve product maintainability.
4. Code 4 Enhancement: This type code describes changes to a product's specification, whether through innovative engineering or by adding a saleable feature to an existing product, that enhances the product's capabilities or performance.

NOTE

When engineering changes to options are being made, care must be taken to re-evaluate the Export Category Code assigned to the option to determine if the enhancement has caused a change to the Export Category. To both determine if a category change is applicable and to identify the most current Technical Export contracts, please refer to Product Managers Checklist that is available from your Country Export Department. (U.S. based employees may refer to VTX DIET.)

5. Code 5 Documentation: This type code is used to identify an ECO that clarifies or corrects existing engineering documentation (including prior ECOs), but results in no physical change to the product. Part revision(s) of an existing product *SHALL NOT* be changed with a documentation ECO. No effectivity date or serial number is necessary for these changes as there is no physical impact on manufacturing and logistics, or the Service Delivery Organization. Manufacturing and logistics, and the Service Delivery Organization must sign documentation ECOs to validate that the product is not affected.

The engineering, manufacturing and logistics, and the Service Delivery Organization project team is responsible for classifying ECOs. ECO classification decisions shall be reviewed and approved by the appropriate financial representatives, such as the Engineering Finance Manager, Plant Controller, or Service Delivery Organization Maintainability Manager for the total corporate cost impact, which includes an analysis of the effects on transfer cost. The approval signifies that all financial aspects of the ECO have been examined, including levels of inventory that have been agreed to in an approved product business plan. Refer to DEC STD 028-0 and *EL-CP356-00, Corporate Phase Review Process Guide*.

2.2 PRODUCT MATURITY DETERMINATION

ECO cost allocation is influenced by a product's location in its life cycle. The status of a product is determined by the members of the project team. ECO cost allocation is influenced by the agreement by manufacturing and logistics, and engineering that an item is either in its development stage or has progressed to manufacturing and logistics acceptance and product support. Although each stage has distinct characteristics, the most accurate measure of product maturity is agreement by the project team that the product has entered Phase 4B of the phase review process. Refer to DEC STD 028-0 for information about product certification status.

2.3 TRANSFER OF ECO COST RESPONSIBILITY

The transfer of ECO cost responsibility from engineering to manufacturing and logistics, with certain exceptions, shall take place at the earlier of the following two times:

1. Six months after first revenue ship (FRS); see Table 1.
2. At completion of Phase 4A; refer to DEC STD 028-0.

Exceptions are the following:

- When an ECO changes the intended functionality of the product for reasons other than safety, engineering retains ECO responsibility for problems resulting from the enhanced option for six months following FRS of the enhanced option.

- Manufacturing and logistics will accept all financial responsibility for ECOs and their related documentation that were not listed at the time of transfer and that do not fall into the enhancement classification mentioned in above bullet.
- At the time of transfer, the product team will identify and list all ECOs that apply to the product and any others that will remain the financial responsibility of engineering.
- Transfer of ECO cost responsibility also applies to inventory, hard tooling, soft tooling, and test equipment ECOs.
- If an ECO generates the need to upgrade the field or spare inventory, the cost responsibility is to the ECO originator.

Table 1: ECO Expense Matrix

Code ECO for:	Phase 1,2,3	Phase 4A or up to 6 months after FRS	Phase 4B or 6 months after FRS, whichever comes first
Safety	Engineering	Engineering	Manufacturing and Logistics*
Adherence to spec	Engineering	Engineering	Manufacturing and Logistics*
Cost reduction	Engineering	Manufacturing and Logistics	Manufacturing and Logistics
Enhancement	Engineering	Engineering	Engineering
Documentation	Engineering	Engineering	Manufacturing and Logistics

NOTE

*** This matrix includes any ECOs not listed as the financial responsibility of Engineering at the time of transfer of ECO responsibility from engineering to manufacturing and logistics.**

2.4 ITEMS UNRELATED TO ECO COST

The following items are not related to the assignment of ECO cost responsibilities.

- Determination of who is at fault
- Choice of implementation strategy, whether it be Phase-In or retrofit (rework)

2.5 COMPONENTS OF ECO COSTS

ECO costs include scrapped materials, rework, retest, redocumentation, and changes to all manufacturing test equipment affected by the ECO. The nonmaterial costs shall include the direct labor component and overhead applied, not to exceed a 150% rate unless the incremental overhead can be demonstrated to be higher. ECO costs shall not include costs that will become part of the product's standard and fulfillment process cost. See subhead 2.11.

2.6 ECO COSTS

ECO costs are traceable, causal, connected, auditable expenses for material, direct labor (if measured), manufacturing and logistics or engineering overhead that are clearly related to:

- Preparation, planning, and implementation of the ECO event, for example, an engineer's time to modify a blueprint.
- Necessary activities created by the ECO, for example, reworking material, retesting inventory, recalibrating equipment, the replacement of soft tooling (noncapitalized), or redeploying the factors of production.
- Remaining net book values of hard tooling and other long-lived assets that are rendered obsolete by the ECO.
- Rendering existing inventory as materially nonsaleable, for example, the utility of the inventory becomes negligible. The effective date of the ECO becomes the benchmark date for measuring the quantity of inventory. The balance sheet value of the inventory that include clearly associated reserves shall be used as the amount to write-off.
- Unavoidable cancellation charges incurred because of Digital contract modifications that are required by an ECO.

Costs that will be reflected in the future standard cost of a product are not ECO costs. They are product costs that can be inventoried and that are directly absorbed by inventory or the FIFO process.

All tooling and other long-lived assets installed to complete the product changes required by an ECO, as long as they meet Digital specifications for capital equipment, shall be capitalized. These assets shall not be expensed as ECO costs.

2.7 INVENTORY REFERENCE FOR COST OF SCRAP AND REWORK

The inventory levels determined in the financial section of the product business plan that are developed by the project team are to be used for determining financial liability for ECOs before cost responsibility is transferred to manufacturing and logistics. The appropriate measure to use is usually referred to as the inventory shift, which includes raw materials, work in process, and finished goods. This level goal is expressed in months of inventory. The inventory level projected in the business plan should be compared against expected future customer shipments.

If a current business plan does not exist, the project team must agree on an appropriate inventory profile.

Example:

Project team decides to implement an ECO to Option A that will result in manufacturing and logistics retrofit costs. The business plan goal is to have six months of manufacturing inventory. The planned ship goal after the break-in or effectivity date is 100 units a month for the next nine months. Engineering, manufacturing and logistics in accordance with Table 1 has the responsibility to retrofit 600 units.

If, at the break-in or effectivity date, the total units in manufacturing and logistics were 900, then the cost of retrofitting the additional 300 units would be the responsibility of manufacturing and logistics, regardless of the point in the product's life cycle. The project

team owns the responsibility of allocating the cost associated with the excess inventory to the manufacturing and logistics plants.

2.8 TRACKING ECO COSTS

The proper accounting treatment for ECO transactions follows:

1. ECO costs absorbed by design engineering shall be charged to the proper 9XXX account with a trailing valid project number. Any transactions that are recorded in the 9XXX fiscal year 1993 accounts on United States ledgers must comply with the *Common Chart Of Account—Standard Fiscal U.S. Expense Code*. This is available on VTX CCOA.
2. ECO costs that are the responsibility of the manufacturing and logistics plants in possession of the inventory associated with the ECO shall be charged to a discrete 6XXX non-FIFO period expense account. The sole purpose of this separate account is the collection of manufacturing and logistics absorbed ECO costs. Therefore, only ECO transactions shall be recorded in this account. The General Ledger, posting level, and 6XXX account, shall be titled *ECO Variance*.
 - a. If a U.S. manufacturing ledger has an available project reporting system, it may choose to open a discrete project to collect the manufacturing-owned ECO charges. The 9XXX fiscal year 1993 charges to the project shall be booked to the 6XXX ECO variance account. This booking can be accomplished by liquidation of the 9XXX expense account directly to the 6XXX ECO variance account. If the ECO project charges are not directly liquidated to the 6XXX ECO variance account, then a timely reclassification to the 6XXX ECO variance account shall be performed.
 - b. If the manufacturing ledger does not use or does not have a discrete project system available, then the transaction is generally booked directly to the ECO 6XXX account.
3. If the ECO transaction is a cross-charge, the offsetting element of the entry, typically a credit, shall be to an account that is compliance with CARM.
4. All write-offs of net book value charged to ECO accounts or projects must be documented and readily retrievable for external reporting requirements. Typically, for U.S. manufacturing ledgers, the gain or loss on disposal is booked to expense account 9XXX. Then, by liquidating the 9XXX directly to the 6XXX ECO variance account, or by means of a timely reclassification to the 6XXX ECO variance account, the loss on disposal of the long-lived asset is recorded as an ECO variance.
5. All charges to the ECO variance account must be documented with a clear audit trail.
6. All charges must be analyzed for possible R and E tax credit qualification (U.S. only).
7. Cost absorption responsibility for manufacturing owned ECOs is generally assigned to the plants in physical possession of the inventory associated with the ECO. The general rule of physical possession shall be modified by a specific *Ninety (90) Day Rule*.

NOTE

The Ninety (90) Day Rule—inventory is occasionally transferred between manufacturing facilities on a temporary basis. The purpose of the transfer may include activities such as the repair, revision, or testing of material. In

such cases the material will have been transferred to the receiving plant both physically and from an accounting stand-point.

For temporary transfers of inventory between plants, the receiving site will absorb ECO charges only if the following conditions exist simultaneously.

- The inventory is accounted for and is physically in the possession of the receiving plant when the material is rendered obsolete by an ECO.
- The inventory has been in the continuous possession of the receiving plant for *more than ninety (90) days*. The timetable for possession begins with the inventory shipment date.

2.9 CONTINUED ENGINEERING ECO RESOURCE PLANNING

Regardless of who or which group or department bears financial responsibility for a product's ECOs, engineering will plan its resources to provide the expertise needed to design and document product changes. The level of need can be determined by the project team managers.

The amount and source of funding for such engineering resources must be negotiated between engineering, manufacturing and logistics.

2.10 FIELD CHANGE ORDER COSTS

Once an option or product has been shipped to the field, any rework or retrofit expense related to units in the field or in spares inventory becomes the responsibility of engineering, to be distributed according to field change order (FCO) costs policies. Refer to *DEC STD 071-0 Field Change Order Policy - Introduction*, subhead 2.1.4.

2.11 TOOLING AND TEST EQUIPMENT

Engineering has financial responsibility for tooling and test equipment ECOs until six months after first revenue ship (FRS) or phase 4B, whichever comes first. At the transition date, a list of ECOs will be prepared and approved by engineering, manufacturing and logistics representatives on the project team. All ECOs on this list will remain the financial responsibility of engineering. All tooling and test equipment that should be capitalized must be capitalized, and not charged to ECO expense.

2.11.1 Soft Tooling

Engineering has the responsibility to pay for the replacement of the soft tools, in the absence of hard tools, made obsolete by an ECO that is engineering's responsibility. Generally, a soft tool has a useful life of less than one year.

2.11.2 Hard Tooling and Test Equipment

If the hard tooling and test equipment documentation has been signed off by engineering and the hard tool and test equipment has been made obsolete by an ECO that is engineering's responsibility, engineering has the financial responsibility to pay for the rework or write-off of the obsolete hard tool and test equipment.

If the hard tooling and test equipment documentation has not been signed off, manufacturing and logistics owns the financial responsibility for the obsolete hard tool and test equipment.

2.12 EFFECTS OF PRODUCT COST CHANGE ON STANDARD COST

Standard cost accounting practice associated with ECO costs are defined by manufacturing and logistics and engineering finance policies and procedures. Refer to the appropriate group cost accounting representative for such information.

APPENDIX A REFERENCED DOCUMENTS

A.1 Digital Documents, EL-Class

Document Number	Document Title
EL-00028-00	<i>DEC STD 028-0 Phase Review Policy</i>
EL-00071-00	<i>DEC STD 071-0 Field Change Order Policy - Introduction</i>
EL-00100-00	<i>DEC STD 100-0 Policy and Requirements for the Product Change Process</i>
EL-00100-01	<i>DEC STD 100-1 Engineering Change Orders - Hardware</i>
EL-CP356-00	<i>Corporate Phase Review Process Guide</i>

A.2 Digital Documents, Other Than EL-Class

Document Number	Document Title
POLICY 301-20	<i>Corporate Accounting and Report Manual (CARM)</i>

A.3 Ordering Information

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Use VTX CORPFIN to access a copy of Policy 301-20.

APPENDIX B RELATED DOCUMENTS

B.1 Digital Documents, EL-Class

Document Number	Document Title
EL-00060-00	<i>DEC STD 060-0 Design of Hardware Products to National and International Regulations and Standards, Policies and Procedures</i>
EL-00102-00	<i>DEC STD 102-0 Environmental Standard for Computers and Peripherals—General Test Requirements</i>
EL-00119-00	<i>DEC STD 119-0 Digital Product Safety—Introduction and General Requirements</i>

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